REMARKS

The Office Action mailed June 22, 2005 has been carefully considered. Within the Office Action, Claims 1-12 and 14-21 have been rejected. Within the present response, the Applicants have amended Claims 1 and 11 to change the term "null detection" to "null condition detection" to exactly track the language of the specification. It is not believed that this amendment affects the scope of the claims but it is made for the convenience of the Examiner. Applicants have also added new Claims 22-24. Reconsideration in view of the following remarks is respectfully requested.

Rejections under 35 U.S.C. § 103

Claims 1, 20, and 21

Claims 1, 20 and 21 have been rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Lai et al., U.S. Patent 6,763,486 (hereinafter Lai) in view of Haulin, U.S. Patent No. 5,996,102 (hereinafter Haulin). This rejection is respectfully traversed.

Specifically, the Office Action contends, among other things, that Lai allegedly discloses an input test buffer having null detection capability and an interface mechanism for providing at least partial test coverage for at least one of five fault syndromes that may be encountered during boundary scan testing. The Applicants respectfully disagree for the reasons set forth below.

The claimed invention is directed to systems and methods which address detection of fault masking which can occur during the testing of integrated circuits (ICs). One aspect of the invention is to test interconnections between ICs by utilizing the input buffer at the receiving end to identify faults. Faults, however, can only be detected if the input buffer of this invention generates outputs which preserve the incoming state and discriminates between a faulty and

proper interconnection. The problem that the invention addresses is with existing input buffers in which the input buffer may output a logic 1 or 0 by default even though the signal's value is uncertain. This inaccurate output masks the real output of what the signal actually is. In other words, the uncertainty of the signal in which the input buffer neither recognizes the signal as logic 1 or 0 is defined as the null condition. (Present Specification, Paragraph 20).

In an input buffer having differential signal lines (e.g. Lines 1 and 2), null conditions are identified in embodiments where the threshold voltage difference between the two lines, L1 and L2, fails to develop. In other words, the input buffer identifies a null condition where the differential voltage between the inputs L1 and L2 is not greater than the threshold voltage such that a faulty condition is recognized. (Present Specification, Paragraph 26). This "null condition" therefore indicates when one of the five fault syndromes has been detected. (Present Specification, Paragraph 21). The five fault syndromes are described in the present specification as well as illustrated in Figure 3. (Present Specification, Paragraph 25).

In contrast, Lai discloses a system which detects manufacturing defects based on frequency-selected parameters. Lai discloses that AC coupled signal paths have an undesirable effect of masking, whereby masking occurs when a defect in one line L1 of a differential pair does not prevent information from being transmitted on the other line L2 at lower frequencies, but results in substantially degraded performance at high frequencies. The Lai system in Figure 6 applies the AC signal to different frequencies (frequency high and frequency low) along with a reference frequency. The frequency encoder in Lai maps incoming data into the high and low frequencies which are applied to the transmitter output driver. The input buffer receives the mapped data and outputs it whereby the received data is essentially stripped and compared with the original data sent by the transmitter.

In regards to the embodiment shown in Figure 10 in Lai, the Lai system has two single ended receiving boundary scan receivers AUX_1 and AUX_2 each having one input from the differential input and one input from the reference frequency input. In addition, the AUX_1 and AUX_2 receivers are connected to their own respective boundary decoders. Each AUX receiver compares the high or low frequencies transmitted from the driver to the receiver input buffer and determines if the signals are distorted or whether a signal is detected at all. (Lai, Col. 6, Lines 38-45). However, in contrast to the claimed invention, this is not the "null condition" as explained in the present specification (see, e.g., Paragraphs 20 - 26 of the Specification). In addition, the input buffer in Lai does not have the null condition detection capability. Instead, the AUX_1 and AUX_2 receivers in Lai are located prior to the input buffer and are thus not part of the input buffer. (Lai, Col. 5, Lines 46-49) (emphasis added). In fact, there is no hint, teaching or suggestion in Lai that its input buffer has the ability to discern whether a null condition exists from signals received over the differential pair. That is precisely the problem with the input buffer in Figure 7 of Lai, in which the input buffer cannot detect the one-line failure which is associated with the "masking" defect expressed in Lai's Background section. (Lai, Col. 5, Lines 35-42). Instead, the AUX_1 and AUX_2 receivers are used to analyze the high and low frequencies to determine if a defect is present, whereby their respective boundary decoders are able to determine which one input line of the differential pair has failed.

As stated above, Lai does not disclose an input test buffer having differential null condition detection capability as recited in amended Claim 1. The term "null condition" in Claim 1 is defined as the condition in which the input buffer does not recognize the analog signal level as being logic 1 or logic 0 (see, e.g., Paragraphs 20 - 26 of the Specification). In contrast, Lai analyzes whether the high frequency line in the differential has unacceptably degraded performance to determine if a defect is present. Thus, the "null condition" detection term in

Claims 1, 11, 20 and 21 must be interpreted by the definition provided in the present specification. *In re Zletz*, 893 F.2d 319, 321 (Fed. Cir. 1989) ("The words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification.")

Further, regarding the phrase "at least one of five fault syndromes" in Claim 1, the Office Action does not point to any specific hint, teaching or suggestion in Lai or any of the other references of an interface mechanism which provides for at least partial test coverage for least one of five fault syndromes (emphasis added). Thus, if Applicants were to assume that the present Office Action is purporting to take official notice of this fact under M.P.E.P. 2144.03 as being "well-known" in the art, then Applicants hereby respectfully traverse the assertion and request that a reference be cited in support of the position outlined in the Office Action. See M.P.E.P. 2144.03

For at least the reasons stated above, neither Lai nor Haulin teach the elements and limitations set forth in Claim 1 nor do they alone or together provide the motivation to one skilled in the art to combine Lai with Haulin in some fashion to reach the claimed invention. Accordingly, Claim 1 is patentable over Lai and Haulin, individually or in combination.

With respect to Claim 20, Lai does not teach "detecting a differential null condition in the digital differential test signal pair indicating that one of the five fault syndromes has occurred." As stated above, Lai fails to disclose a differential null condition as well as the recitation of "indicating one of five fault syndromes." For at least these reasons, one skilled in the art would have no motivation to combine Lai with Haulin to reach the claimed invention. Therefore, Claim 20 is patentable over Lai and Haulin, individually or in combination.

With respect to Claim 21, Lai does not teach "means for detecting a differential null condition in the digital differential test signal pair indicating that one of the five fault syndromes has occurred." As stated above, Lai fails to disclose a null condition as well as the recitation of

"indicating one of five fault syndromes." For at least these reasons, one skilled in the art would have no motivation to combine Lai with Haulin to reach the claimed invention. Therefore, Claim 21 is patentable over Lai and Haulin, individually or in combination.

Rejections under 35 U.S.C. § 103a

Claims 2-6, 8, 11, 12, 14, 15 and 17

Claims 2-6, 8, 11, 12, 14, 15 and 17 have been rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Lai in view of Kim et al., "Frequency Detection-Based Boundary-Scan Testing of AC Coupled Nets" (hereinafter Kim) and further in view of Haulin, among which Claim 11 is an independent claim. This rejection is respectfully traversed.

With respect to Claim 11, it recites "an interface mechanism for providing at least partial test coverage for at least one of the five fault syndromes" and an input test buffer having differential null condition detection capability in the preamble. As stated above, Lai fails to disclose a null condition as well as the recitation of "indicating one of five fault syndromes." For at least these reasons, one skilled in the art would have no motivation to combine Lai with Haulin and Kim to reach the claimed invention. Therefore, Claim 11 is patentable over Lai, Haulin, and Kim individually or in combination.

As to dependent Claims 2-6 and 8, these claims are dependent on independent Claim 1. Dependent Claims 12, 14, 15 and 17 are dependent on independent Claim 11. As stated above, Claims 1 and 11 are allowable over the cited prior art references. Accordingly, Claims 2-6, 8, 12, 14, 15 and 17 are also allowable as being dependent on allowable base claims.

Claims 7 and 16

Claims 7 and 16 have been rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Lai et al in view of Kim and Haulin and further in view of Ichie, U.S. Patent No. 5,050,187 (hereinafter Ichie). This rejection is respectfully traversed.

As to dependent Claim 7, this claim is dependent on independent Claim 1. Dependent Claim 16 is dependent on independent Claim 11. As stated above, Claims 1 and 11 are allowable over the cited prior art references. Accordingly, Claims 7 and 16 are allowable as being dependent on allowable base claims.

Claims 9, 10, 18 and 19

Claims 9, 10, 18 and 19 have been rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Lai et al in view of Kim and Haulin and further in view of Ichie and further in view of Koenemann et al., U.S. Patent No. 5,617,426 (hereinafter Koenemann). This rejection is respectfully traversed.

As to dependent Claims 9 and 10, these claims are dependent on independent Claim 1. Dependent Claims 18 and 19 are dependent on independent Claim 11. As stated above, Claims 1 and 11 are allowable over the cited prior art references. Accordingly, Claims 9, 10, 18 and 19 are allowable as being dependent on allowable base claims.

New Claims

The Applicants have added new Claims 22-24 in the present reply. Claims 22-24 are fully supported by the specification and are allowable over the cited prior art. Accordingly, Claims 22-24 are in condition for allowance.

Conclusion

It is believed that the above amendments and remarks place the above-identified patent application into condition for allowance. Early favorable consideration of this application is earnestly solicited.

If, in the opinion of the Examiner, an interview would expedite the prosecution of this application, the Examiner is invited to call the undersigned attorney at the number indicated below.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case. Please charge any additional required fee or credit any overpayment not otherwise paid or credited to our deposit account No. 50-1698.

Respectfully submitted,

THELEN REID & PRIEST, LLP

Dated: 9/22/05

S. Bhatt

Suvashis Bhattacharya
Reg. No. 46,554

Thelen Reid & Priest LLP
P.O. Box 640640
San Jose, CA 95164-0640
Tel. (408) 292-5800
Fax. (408) 287-8040